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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,444	01/14/2004	Chi tse Wu	H0002800.34350 USA -4015	7831
128 7590 10/14/2011 HONEYWELL INTERNATIONAL INC. PATENT SERVICES 101 COLUMBIA ROAD P O BOX 2245 MORRISTOWN, NJ 07962-2245			EXAMINER MCDONALD, RODNEY GLENN	
			ART UNIT 1724	PAPER NUMBER
			MAIL DATE 10/14/2011	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/759,444	<b>Applicant(s)</b> WU ET AL.	
	<b>Examiner</b> RODNEY MCDONALD	<b>Art Unit</b> 1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 5) ☒ Claim(s) 67-76 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 67-76 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____.                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____.  | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 69 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 69 is indefinite because it requires the target to consist essentially of tantalum while claim 67 has been amended so that the target must contain copper.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 67, 69, 70 and 72-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al. (U.S. Pat. 6,471,831) in view of Kardokus et al. (U.S. Pat. 6,113,761) and Michaluk (U.S. PG PUB. 2002/0157736 A1).

Regarding claims 67, 69, Lu et al. teach a three dimensional physical vapor deposition target. The target can comprise a material for metallization such as Ta or Ti or ***any other material (i.e. Cu or Cu and Ta inasmuch as the claim amendment is interpreted as such)***. The target has a shape, the shape includes at least one cup having a first end and a second end in opposing relation to the first end. The first end having an opening extending therein. The cup having a hollow therein. The hollow extending from the opening in the first end toward the second end. The cup having an interior surface defining a periphery of the hollow. A sputtering surface defined along the interior surface of the cup. The target is monolithic. The target has an exterior surface extending around the second end at rounded corners. (Figs. 1, 3-5; Column 2 lines 41-53)

As to the target comprising a cast ingot the process is given no weight since the product is substantially identical to the claimed subject matter. It should be noted that [E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re

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Thorpe, 777F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted)

Furthermore cast ingots will be discussed below.

The differences between Lu et al. and the present claims is that the average grain size of less than or equal to 250 microns is not discussed with respect to three dimensional Cu targets (claim 67), casting is not discussed (Claim 67), the target being CuSn with Sn being present from about 100 ppm to about 3 atomic percent (Claim 70), the target being CuAg with Ag being present from about 100 ppm to about 3 atomic percent (Claim 72) and the grain size of the target is not discussed (Claims 73-76).

Regarding claim 67, 73-76, Kardokus et al. teach the grain size of a Cu target to be not more than 50 microns in planar targets. (Column 8 lines 57-59) Addressing the issue that Kardokus is limited only to planar targets one of ordinary skill in the art would be able to form the planar targets into three dimensional cup shaped target because Michaluk recognize that planar billets can be used as sputtering targets but that the billets can be shaped to form end products such as hollow cathode magnetrons and cup shapes with a fine, more homogeneous microstructure using his processing steps. (See Michaluk Abstract; Paragraphs 0017, 0018, 0022, 0032)

Regarding casting (Claim 67), Michaluk teach cast ingots for targets. (Abstract; Paragraph 0017, 0018, 0022, 0032)

Regarding claim 70, Kardokus et al. teach Sn present with CuSn. Alloying levels typically can be at least about 100 ppm. (Column 5 lines 8-16; Column 5 lines 20-24)

Regarding claim 72, Kardokus et al. teach Ag present with CuAg. Alloying levels typically can be at least about 100 ppm. (Column 5 lines 8-16; Column 5 lines 20-24)

The motivation for utilizing the features of Kardokus et al. is that it allows for forming interconnects on wafers. (Kardokus et al. Column 2 lines 43-45)

The motivation for utilizing the features of Michaluk is that it allows producing a sputtering target with more homogenous microstructure. (Michaluk Paragraph 0023)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Lu et al. by utilizing the features of Kardokus et al. and Michaluk because it allows for forming interconnects on wafers and for producing a sputtering target with more homogenous microstructure.

Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al. in view of Kardokus et al. and Michaluk as applied to claims 67, 69, 70 and 72-76 above, and further in view of Kulkarni et al. (U.S. Pat. 6,283,357).

The difference not yet discussed is the target material consisting essentially of copper and wherein the target consists essentially of the same material. (Claim 68).

Regarding claim 68, Kulkarni et al. suggest various materials for sputtering targets. Among those materials is suggested copper. (Column 3 lines 35-51)

The motivation for utilizing a copper target is that it allows forming copper interconnects for metallization. (Column 3 lines 35-51)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Kulkarni because it allows for forming copper interconnects for metallization.

Claim 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lu et al. in view of Kardokus et al. and Michaluk as applied to claims 67, 69, 70 and 72-76 above, and further in view of Pavate et al. (U.S. Pat. 6,391,163).

The difference not yet discussed is utilizing aluminum in the copper target.  
(Claim 71)

Regarding claim 71, Pavate et al. teach utilizing aluminum on a copper target.  
(Column 3 lines 20-29)

The motivation for utilizing the features of Pavate et al. is that it allows for increasing the hardness of the target. (Column 3 lines 20-29)

Therefore, it would have been obvious to one of ordinary skill in the art at the invention was made to have utilized the features of Pavate et al. because it allows for increasing the hardness of the target.

### ***Response to Arguments***

Applicant's arguments filed July 22, 2011 have been fully considered but they are not persuasive.

In response to the argument that Michaluk's teachings can not be used because Michaluk do not relate to copper targets, it is argued that Michaluk's teachings can be applied to any targets that comprise material for metallization. Michaluk's specifically state that any other material can be used which encompasses copper. (See Michaluk discussed above)

In response to the argument that two dimensional targets of Kardokus are not analogous to three dimensional targets, it is argued that as suggested by Michaluk two

dimensional billets having a small grain size can be formed into hollow cathode magnetron sputtering targets and cup shaped products. (See Michaluk discussed above)

In response to the argument that there is no discussion of using a cast ingot, it is argued that Michaluk teach that the tantalum billets can be a cast ingot. (See Michaluk discussed above)

In response to the argument that Lu does not teach targets having a small grain size, it is argued that Kardokus teach how to achieve small grain size in two dimensional targets and Michaluk show that two dimensional target billets having small grain size can be formed into hollow cathode magnetron sputtering targets and cup shaped products. (See Lu, Kardokus and Michaluk discussed above)

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.



Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODNEY MCDONALD whose telephone number is (571)272-1340. The examiner can normally be reached on M-Th with every Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith D. Hendricks can be reached on 571-272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rodney G. McDonald/  
Primary Examiner, Art Unit 1724

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Primary Examiner  
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RM  
October 11, 2011